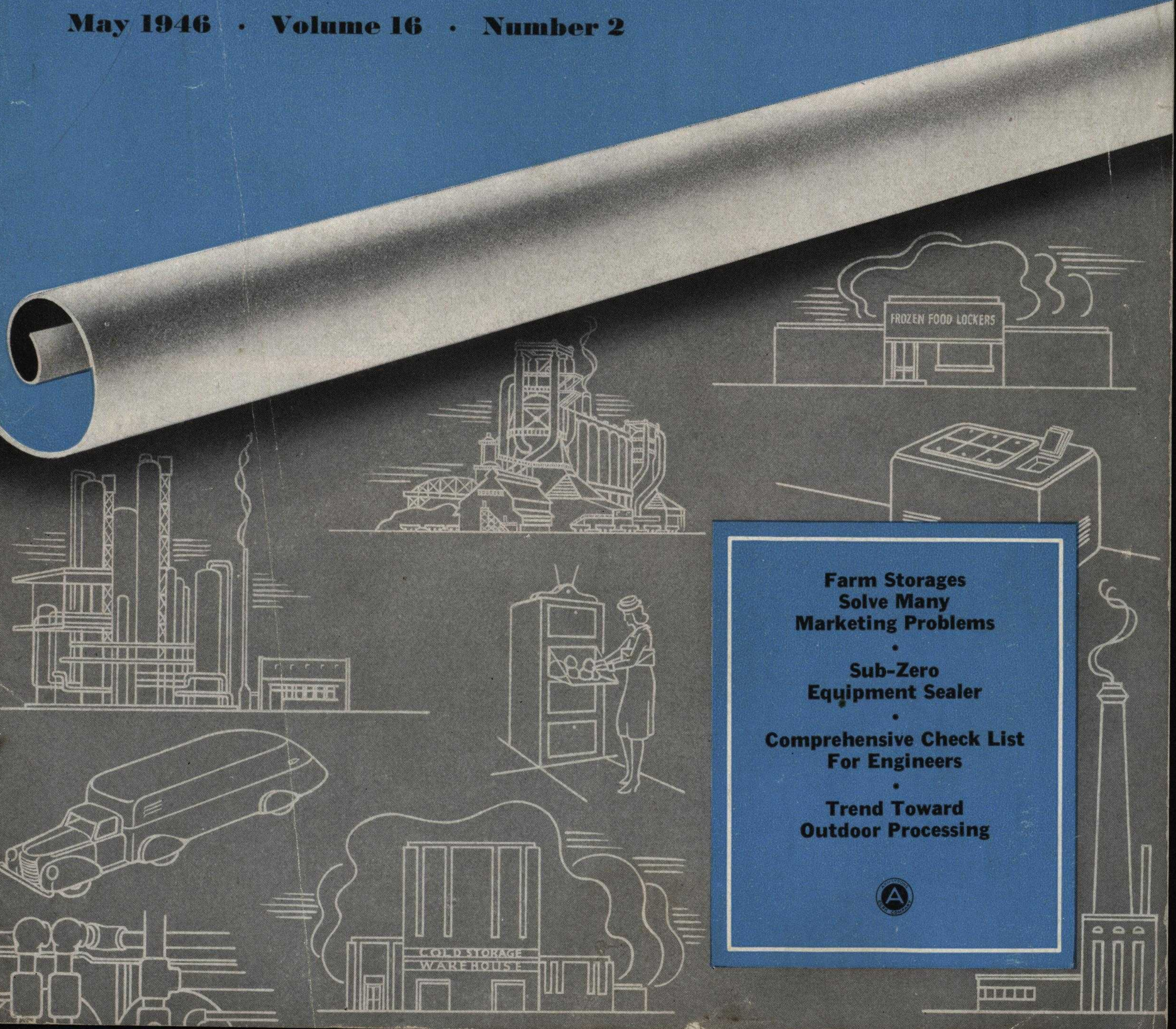
ARMSTRONG'S Insulator

May 1946 · Volume 16 · Number 2



Farm Storages Solve Many Marketing Problems

•

Sub-Zero Equipment Sealer

•

Comprehensive Check List For Engineers

•

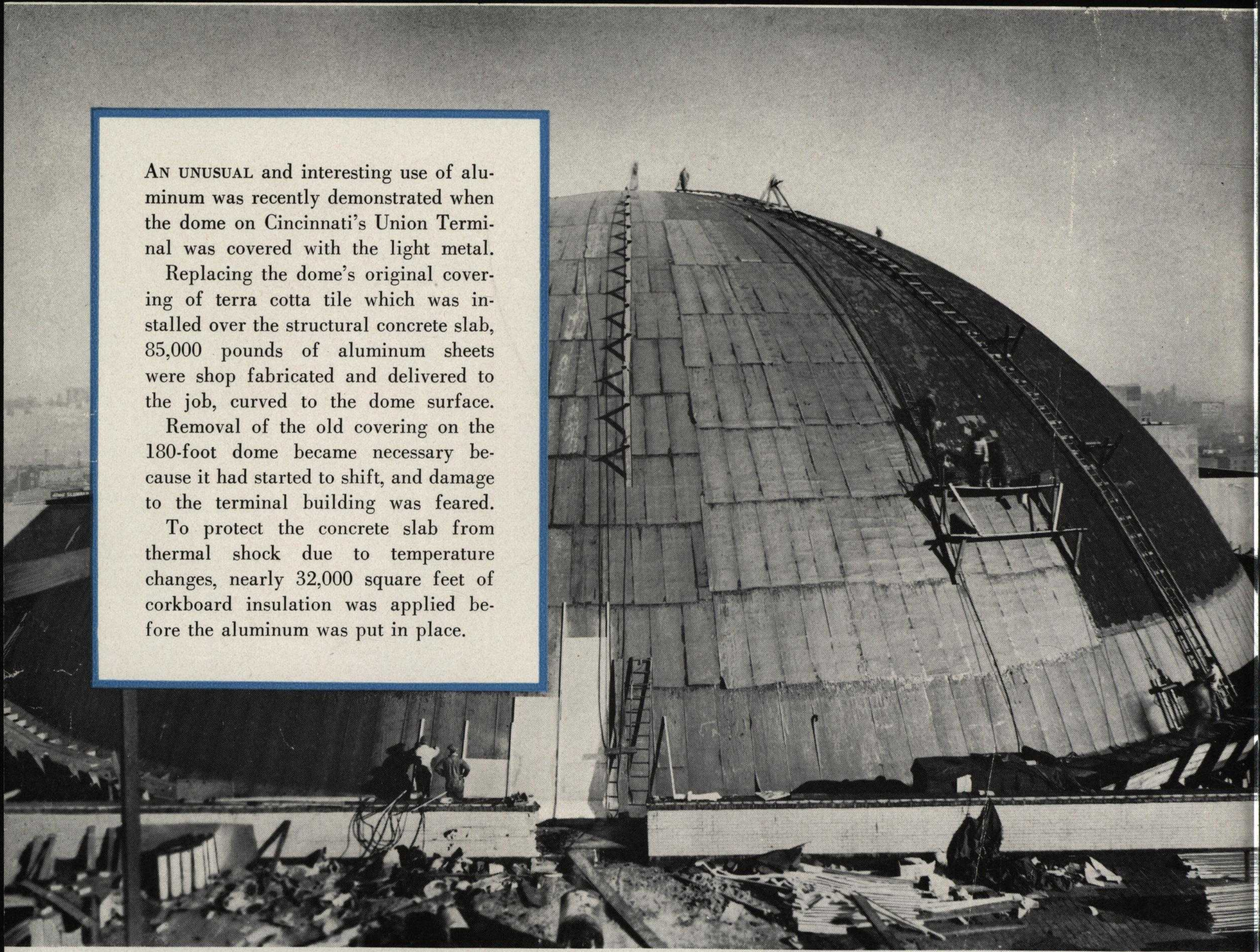
Trend Toward Outdoor Processing

AN UNUSUAL and interesting use of aluminum was recently demonstrated when the dome on Cincinnati's Union Terminal was covered with the light metal.

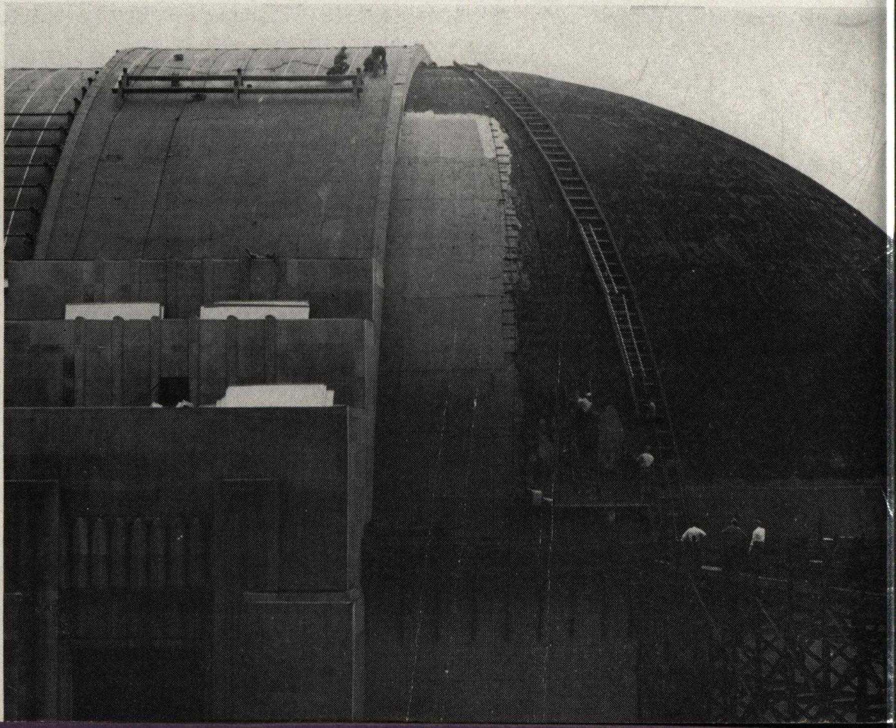
Replacing the dome's original covering of terra cotta tile which was installed over the structural concrete slab, 85,000 pounds of aluminum sheets were shop fabricated and delivered to the job, curved to the dome surface.

Removal of the old covering on the 180-foot dome became necessary because it had started to shift, and damage to the terminal building was feared.

To protect the concrete slab from thermal shock due to temperature changes, nearly 32,000 square feet of corkboard insulation was applied before the aluminum was put in place.



A NEW CAP FOR CINCINNATI'S UNION TERMINAL



ARMSTRONG'S Insulator

MAY 1946 VOLUME 16 NUMBER 2

CONTENTS

HOW COLD STORAGES on the farm help overcome marketing problems for fruit and vegetable growers starts on page 2.

A NEW SEALER to prevent moisture infiltration has been developed for use on refrigerated equipment. The story is on page 5.

A COMPREHENSIVE CHART for figuring types and thicknesses of insulating material is reproduced on pages 6 and 7.

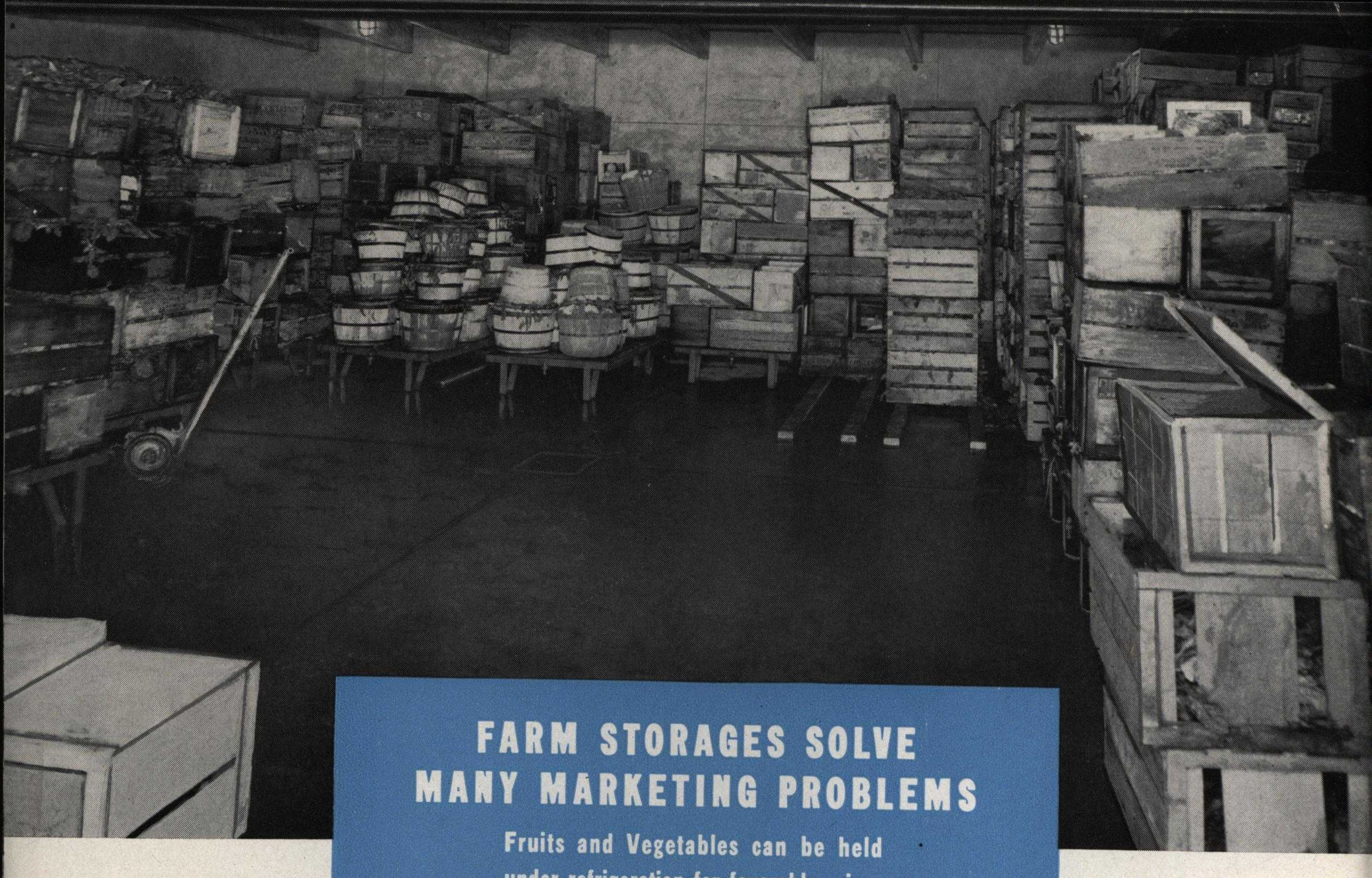
SOME OF THE PROBLEMS to be solved when insulated lines and equipment are placed outdoors are described on page 8.

CONSTRUCTION DETAILS of a model ice cream hardening room for operation at 25° to 35° F. below zero are shown on page 11.

A NEW WALK-IN FREEZER which is shipped in sections and assembled in home, store, or restaurant is described on page 13.

PUBLISHED BY THE ARMSTRONG CORK COMPANY, BUILDING MATERIALS DIVISION, LANCASTER, PENNSYLVANIA, AS A SERVICE TO ALL INDUSTRIES EMPLOYING INSULATION FOR HIGH AND LOW TEMPERATURES.

COPYRIGHT 1946, ARMSTRONG CORK COMPANY, LANCASTER, PA.



FARM STORAGES SOLVE MANY MARKETING PROBLEMS

Fruits and Vegetables can be held under refrigeration for favorable prices

THE FARMER has always been concerned with growing bigger and better crops. New techniques and machinery have helped him improve both the quantity and quality of his production. But for his marketing problems, he has not, in the past, found comparable solutions.

One of the answers he has found recently, in marketing fruits and vegetables, is refrigerated storages—storages right on the farm. Insulated refrigerated storages are now considered important farm "tools," and research on new developments points to ways that may make them even more important.

STORAGES KEEP QUALITY UP

Modern storage facilities give the grower several distinct advantages. The most important is the matter of timing to obtain the best prices. He can either sell his products at harvest time if prices are favorable or, if prices are low, he can, in many cases, hold them in his storage for better market conditions.

Again, he can keep his products at top quality under refrigeration so they will attract top grade prices when they reach the market. And, in this period of labor shortages, the grower no longer need split his labor force, requiring truck crews to carry the crop to market as it is picked. He just puts his products in his own storage as they are harvested and sends them to market at his convenience, thus reducing his needs for men and equipment.

In recent years there has been a decided increase in the amount of fruits and vegetables grown and consumed in this country. With crops becoming bigger, small unit gains add up to large sums of money. Thus protection of the harvest for top market prices becomes of paramount importance. Many growers secure this protection with refrigerated storages. In the 25 years preceding the war, production of vegetables, particularly the green leafy varieties, had shown an increase of more than 100 per cent, according to figures compiled by the U. S. Department of Agriculture, with some of the different kinds registering spectacular gains. For instance, during this period the commercial production of lettuce increased about 210 per cent, spinach 190, carrots 540, string beans 175, celery 120, and cauliflower 180 per cent.

While the total consumption of fruit per person has not shown the imposing gain of vegetables, there has been a steady upward trend since the beginning of the century. Here the greatest increase has been in citrus fruits, oranges leading the field with 400 per cent.

RESEARCH HAS BEEN EXTENSIVE

State farm schools and the U. S. Department of Agriculture and large growers have been engaged in active research for many years seeking the solution to the problem of storing farm products.

Natural air-cooled storages were the earliest attempts to preserve fruits and vegetables for favorable market conditions. These were of two general types: cellars and earth-banked storages, and above-the-ground insulated storages, in many cases built within existing farm buildings.

As the name implies, these storages depended wholly on the introduction of cool outdoor air and on insulated walls to protect the stored crop from both warm and cold weather.

Although the natural air-cooled storage has some application for growers interested in roadside marketing or in selling directly to the consumer, this type has its limitations because of the relatively high outdoor temperatures prevailing at the harvest season.

Large growers have used commercial storages to some extent but flexible control of packaging and marketing was lacking.

And so in recent years the modern refrigerated and correctly insulated fruit and vegetable storage on the farm has been gaining wide favor not only because of the accurate control of temperatures possible but because proper humidities can be maintained as well.

In passing it might be well to note that considerable research is being done on refrigerated controlled atmosphere storages for pears and apples. These are gas-tight insulated rooms with carbon-dioxide content of somewhere around 21 per cent. The gas is not usually added but is generated by the natural respiration of the fruit using up the oxygen. Experiments indicate that gas-tight storages might in the future supplement rather than replace regular storages.

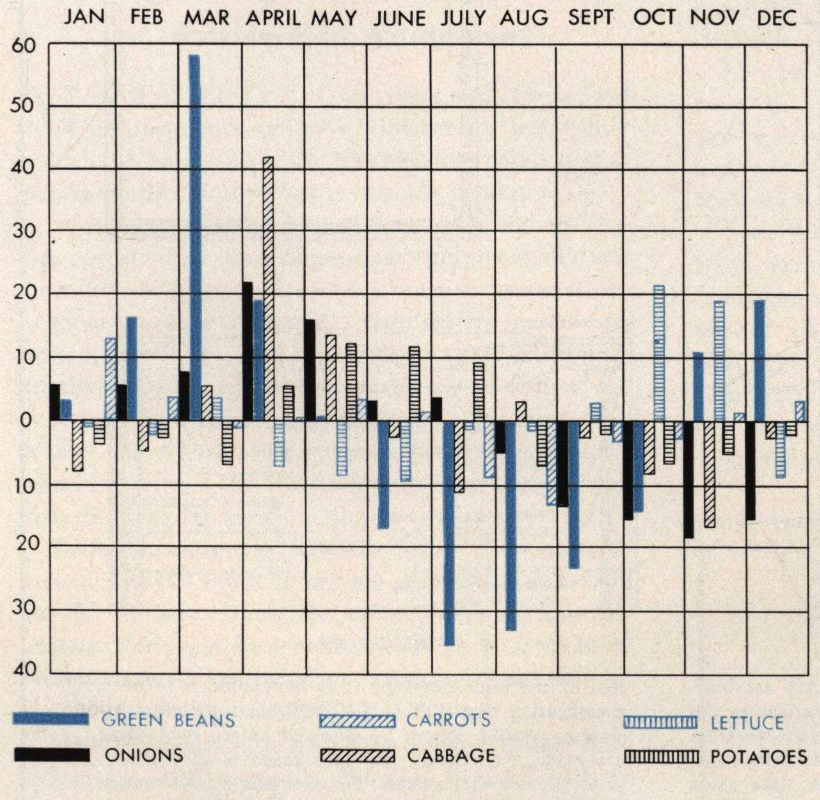
Temperature and humidity levels which have been found to hold the products in the best marketable condition have been well established by authorities.

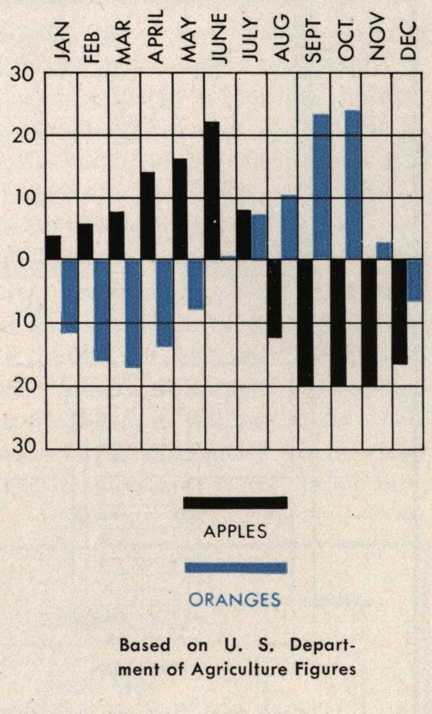
The table which follows on page 4 gives the approximate storage life of some of the more common fruits and vegetables. The wide ranges in some of the figures

VEGETABLE PRICES—1939

APPLE AND ORANGE PRICES—1939

Showing percentage changes from the average of retail prices in 51 cities





Based on U. S. Department of Agriculture Figures

These charts of fruit and vegetable prices in 1939, an average prewar year, based on U. S. Department of Agriculture figures, graphically illustrate the wide spread in prices between the harvest months and those months in which supplies are short. Refrigerated storages can, in many cases, be used to hold products away from glutted markets, assuring better prices.

are occasioned by the many different varieties grown.

Commodity	*Approximate Storage Life*
Apples	2 to 8 mo's
Beans	
Green, snap, lima	2 to 4 w'ks
Beets	
Topped	1 to 3 mo's
Bunch	10 to 14 days
Cabbage	3 to 4 mo's
Carrots	
Topped	4 to 5 mo's
Bunch	10 to 14 days
Cauliflower	2 to 3 w'ks
Celery	2 to 4 mo's
Grapefruit	6 to 8 w'ks
Lemons	1 to 4 mo's
Lettuce	2 to 3 w'ks

Commodity	*Approximate Storage Life*
Oranges	8 to 10 w'ks
Peaches	2 to 4 w'ks
Pears	
Bartlett	45 to 90 days
Fall and winter varieties	2 to 7 mo's
Peas	
Green	1 to 2 w'ks
Plums (including prunes)	3 to 8 w'ks
Potatoes	3 to 5 mo's
Sweet potatoes	4 to 6 mo's
Tomatoes	
Ripe	7 to 10 days
Mature Green	3 to 5 w'ks

When fruits are harvested and cut off from their food supplies, they depend upon the reserves within their own tissues to complete their life cycle of giving forth seeds. If they are to be stored, refrigeration must step in at harvesting to maintain them in prime edible condition by retarding natural ripening and dissipating the heat generated by the products. In other words they must be kept in what can be described as a state of suspended animation, and the growth of mold and bacteria must be prevented.

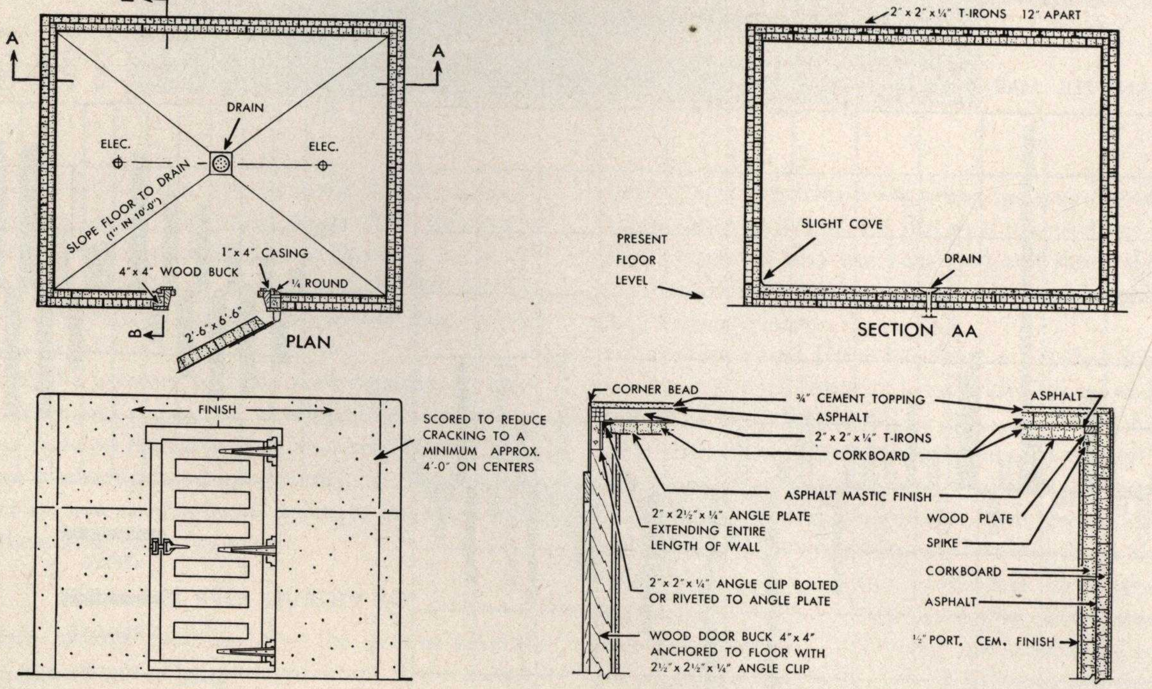
The life cycles of leafy and root vegetables and legumes are somewhat different. Here storage problems are concerned chiefly with proper refrigeration and humidity to prevent loss of moisture, to prevent decay, and to reduce or prevent sprouting of the root types.

High relative humidity ranging from 70 to 95 per cent, depending on the product, must be maintained in all cases to prevent wilting and shriveling.

Farm storages also play an important part in determining the length of time fruits and vegetables can be stored in wholesale and retail markets. For instance, each day's delay in cooling an apple crop from 70° F. to a desirable storage temperature cuts off about ten days from the potential storage life, a sizable loss.

Many produce farmers and orchardists thus have come to the conclusion that only by establishing their own cold storages on the farm and effectively controlling their own marketing program can they profitably regulate the flow of crops to the consumer.

Fruit and Vegetable Storage Room Diagram


B
A
A
DRAIN
ELEC.
ELEC.
SLOPE FLOOR TO DRAIN (1" IN 10'-0")
1"x 4" CASING
4"x 4" WOOD BUCK
¼ ROUND
B
2'-6"x 6'-6"
PLAN
2"x 2"x ¼" T-IRONS 12" APART
SLIGHT COVE
PRESENT FLOOR LEVEL
DRAIN
SECTION AA
FINISH
SCORED TO REDUCE CRACKING TO A MINIMUM APPROX. 4'-0" ON CENTERS
ELEVATION
CORNER BEAD
¾" CEMENT TOPPING
ASPHALT
2"x 2"x ¼" T-IRONS
CORKBOARD
ASPHALT
ASPHALT MASTIC FINISH
2"x 2½"x ¼" ANGLE PLATE EXTENDING ENTIRE LENGTH OF WALL
WOOD PLATE
SPIKE
CORKBOARD
2"x 2"x ¼" ANGLE CLIP BOLTED OR RIVETED TO ANGLE PLATE
ASPHALT
WOOD DOOR BUCK 4"x 4" ANCHORED TO FLOOR WITH 2½"x 2½"x ¼" ANGLE CLIP
½" PORT. CEM. FINISH
SECTION BB

In many cases fruit and vegetable storages are built within an existing farm building thus eliminating the cost of masonry construction. This particular construction is self-supporting and utilizes free-standing corkboard walls. Except for the exterior finish, these same specifications can generally be used when the insulation is erected against masonry or frame walls regardless of the size. However, it is impossible to write a specification that will fit all conditions; therefore assistance should always be obtained before final plans are made. No attempt has been made to give dimensions, as they vary greatly. For example, a fruit storage might be 37' x 74' x 12' high, outside dimensions, with a 13,000-bushel storage capacity.

SUB-ZERO SEALER

New Product Prevents Infiltration of Vapor into Insulation of Refrigerated Equipment

MANUFACTURERS of ice cream and frozen food cabinets and similar equipment for heavy-duty work long have sought the ideal sealing compound to prevent infiltration of vapor into the insulation.

Such a compound is essential for long and successful operation of low-temperature equipment. It must be able to stand up under a wide range of temperatures without cracking or flowing. Also, sealers must be resilient, moisture- and vaporproof, and sufficiently pliable to resist normal impact and torque action.

Armstrong's Research Laboratory, after more than a year and a half of development work based on previous experience, has produced a positive sealer which fills this long-felt need.

Called Armstrong's Sub-Zero Sealer, this new compound will not crack in service at temperatures down to 25° F. below zero. Its melting point is approximately 250°, and its penetration at 77° F. is 40 to 50 which means that Sub-Zero Sealer will not flow at 160° F. Its flash point is 625° F.

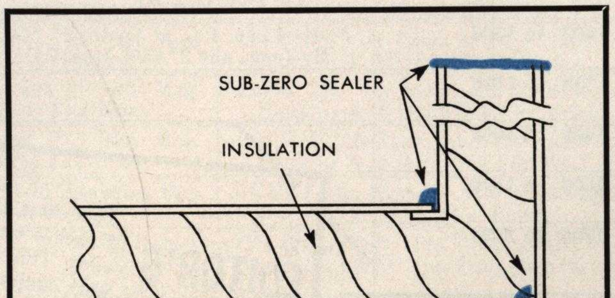
Bonding tightly to wood, metal, Temlok*, corkboard, glass, and other materials, Sub-Zero Sealer fulfills its real function of keeping vapor and moisture laden air from the insulation space. In an all-steel construction, it is poured along the welded seams and under the breaker strips. In a combination wood and steel construction, it is poured along the joints where the wood and steel meet. It also is used to seal the top of the insulation in the side walls before the cabinet cover is installed. The technique of handling the sealer is the same as that for any hot asphaltic compound.

The new product is a tough, rubber-like, resilient resin of excellent stability. Although it starts out in production as a colorless liquid, plasticizing turns it to a shiny ebony black. Being odorless it can be used on food cabinets without any possibility of tainting.

Even where the sealer is not exposed to zero and lower temperatures, its physical characteristics make it advantageous in the manufacture of commercial cabinets of all types. It will not flow when the finished equipment is made, stored, or shipped during high summer temperatures. And it will not crack where shipment or storage might be required where winter weather might drop temperatures to 25° below zero.

---

*REG. U. S. PAT. OFF.



HANDY CHECK LIST

Comprehensive Check List fo

This chart is a guide to assist in determining the typ ness of insulation for industrial applications for te from 300° below zero to 2800° F. Note that several sulation frequently are shown in one group. This do that each insulation is equally suited for all applica

Temp.	Lines ¼″ Thru 1½″	Lines 2″ Thru 7″	Lines 8″ Thru 2
−300° to −250°	6″ to 8″ Wall Thickness Cork Covering	9″ to 11″ Wall Thickness Cork Covering	12″ to 14″ Wall Thickness C
−250° to −200°	5″ to 7″ Wall Thickness Cork Covering	8″ to 10″ Wall Thickness Cork Covering	11″ to 13″ Wall Thickness Co
−200° to −150°	5″ to 6″ Wall Thickness Cork Covering	7″ to 8″ Wall Thickness Cork Covering	9″ to 11″ Wall Thickness Cor
−150° to −100°	4″ to 5″ Wall Thickness Cork Covering	6″ to 7″ Wall Thickness Cork Covering	8″ to 9″ Wall Thickness Cork
−100° to −50°	S.T.B. Cork Covering to 4″ Cork Covering	5″ to 6″ Wall Thickness Cork Covering	7″ to 8″ Wall Thickness Cork
−50° to −20°	S.T.B. Cork Covering to 4″ Cork Covering	4″ to 5″ Wall Thickness Cork Covering	5″ to 6″ Wall Thickness Cork
−20° to 0°	S.T.B. Cork Covering	S.T.B. Cork Covering	S.T.B. Cork Covering to 5″ C
0° to 20°	Brine Thickness Cork Covering	Brine to S.T.B. Cork Covering	S.T.B. Cork Covering
20° to 50°	Ice Water to Brine Thickness Cork Covering	Brine Thickness Cork Covering	Brine Thickness Cork Coveri
50° to 100°	Ice Water Thickness Cork Covering or ½″—2″ Hairfelt or ½″—2″ Non-Sweat P.C. or ½″—2″ Woolfelt P.C.	Ice Water Thickness Cork Covering or ½″—2″ Hairfelt or ½″—2″ Non-Sweat P.C. or ½″—2″ Woolfelt P.C.	Ice Water Thickness Cork C —2″ Hairfelt or ½″—2″
100° to 200°	1″ Woolfelt P.C. or 1″ Aircell P.C. or Std. Thick 85% Mag. P.C.	1″ Woolfelt P.C. or 1″ Aircell P.C. or Std. Thick 85% Mag. P.C.	1″ Woolfelt P.C. or 1½″ Air Thick 85% Mag. P.C.
200° to 250°	1″ Aircell P.C. or Std. Thick 85% Mag. P.C. or 1″ Bestfelt P.C.	1″ Aircell P.C. or Std. Thick 85% Mag. P.C. or 1″ Bestfelt P.C.	1½″ Aircell P.C. or Std. Th P.C. or 1½″ Bestfelt P.C.
250° to 300°	1″ Aircell P.C. or Std. Thick 85% Mag. P.C. or 1″ Bestfelt P.C.	1″ Aircell P.C. or Std. Thick 85% Mag. P.C. or 1″ Bestfelt P.C.	1½″ Aircell P.C. or Std. Th P.C. or 1½″ Bestfelt P.C.
300° to 350°	Std. Thick 85% Mag. P.C. or 1″ Bestfelt P.C.	Std. Thick to 1½″ 85% Mag. P.C. or 1½″ Bestfelt P.C.	1½″ 85% Mag. P.C. or 1½ P.C.
350° to 400°	Std. Thick 85% Mag. P.C. or 1″ Bestfelt P.C.	1½″ to 2″ 85% Mag. P.C. or 1½″—2″ Bestfelt P.C.	2″ 85% Mag. P.C. or 2″ Best
400° to 500°	1½″ 85% Mag. P.C. or 1½″ Bestfelt P.C.	2″ to Dbl. Std. 85% Mag. P.C. or 2″ Bestfelt P.C.	Dbl. Std. 85% Mag. P.C. or felt P.C.
500° to 600°	2″ 85% Mag. P.C. or 2″ Bestfelt P.C.	Dbl. Std. to 3″ 85% Mag. P.C. or 2½″ Bestfelt P.C.	3″ 85% Mag. P.C. or 3″ Best
600° to 700°	2″ Bestfelt P.C. or 2″ Hy-Temp. P.C. Comb. 1½″ Hy-Temp. and 1½″ 85% Mag. P.C.	3″ Bestfelt P.C. or Comb. 1½″ (Nominal) Hy-Temp. and 1½″ 85% Mag. P.C.	3½″ Bestfelt P.C. Comb. 1 and 1½″ 85% Mag. P.C.
700° to 800°	2″ Hy-Temp. P.C. or Comb. 1½″ Hy-Temp. and 2″ 85% Mag. P.C.	Comb. 1½″ (Nominal) Hy-Temp. and 2″ 85% Mag. P. C.	Comb. 1½″ (Nominal) Hy- 85% Mag. P. C.
800° to 1000°	2″ Hy-Temp. P.C. or Comb. 2″ Hy-Temp. and 2″ 85% Mag. P.C.	Comb. 2″ Hy-Temp. and 2″ 85% Mag. P.C.	Comb. 3″ Hy-Temp. and 2″ 8
1000° to 1200°	2″ Hy-Temp. P.C. or Comb. 2″ (Nominal) Hy-Temp. and 2″ 85% Mag. P.C.	Comb. 2″ Hy-Temp. and 2″ 85% Mag. P.C.	Comb. 3″ Hy-Temp. and 2″ 8
1200° to 1400°			
1400° to 1600°			
1600° to 1800°			
1800° to 2800°			

EDITOR'S NOTE

This chart, showing the type and thickness of insulation for temperatures from 300° F. below zero to 2800° F., is one of the most comprehensive of its kind ever developed. This handy reference guide can be used by engineers for quick estimating work and to get a comparison of the thicknesses required where more than one type of material is suited for a particular temperature range.

Service conditions vary so widely that all factors of thermal efficiencies and service characteristics must be considered when determining the best material for the work to be performed. For this reason insulation must be selected for the specific job it is to do, and practical engineering assistance should be obtained to help solve most insulation problems.

Determining Type and Thickness of Insulation Materials

and thick-
nperatures
ypes of in-
not mean
ions. Since

insulating materials vary in thermal efficiencies and service characteristics, selection of materials should not be made without careful consideration of all job conditions. Your nearest Armstrong office will provide practical engineering assistance in selecting materials best suited for your specific requirements.

″	Lines or Equipment 20″ to 54″	Lines or Equipment 54″ to 120″	Equipment Over 120″ and Flat Surfaces
k Covering	14″ to 16″ Cork Lagging	16″ to 18″ Corkboard	22″ Corkboard or 20″ C.B. and 3″ Foamglas
k Covering	13″ to 15″ Cork Lagging	15″ to 17″ Corkboard	18″ Corkboard or 16″ C.B. and 3″ Foamglas
Covering	11″ to 12″ Cork Lagging	12″ to 15″ Corkboard	15″ Corkboard or 13″ C.B. and 3″ Foamglas
overing	9″ to 10″ Cork Lagging	10″ to 12″ Corkboard	12″ Corkboard or 10″ C.B. and 3″ Foamglas
overing	8″ to 9″ Cork Lagging	8″ to 10″ Corkboard	10″ Corkboard or 8″ C.B. and 3″ Foamglas
overing	6″ to 7″ Cork Lagging	7″ to 9″ Corkboard	10″ Corkboard or 8″ C.B. and 3″ Foamglas
k Covering	5″ to 6″ Cork Lagging	6″ to 8″ Corkboard	8″ Corkboard or 10″ Mineral Wool Board or 12″ Foamglas 6″ C.B. and 3″ Foamglas
	4″ Cork Lagging	4″ to 6″ Corkboard	6″ Corkboard or 7″ Mineral Wool Board or 9″ Foamglas 4″ C.B. and 3″ Foamglas
	3″ Cork Lagging	3″ to 4″ Corkboard	5″ Corkboard or 6″ Mineral Wool Board or 8″ Foamglas 3″ C.B. and 3″ Foamglas
vering or ½″ oolfelt P.C.	2″ Cork Lagging or ½″—2″ Hairfelt	2″ Corkboard or ½″—2″ Hairfelt	2″ Corkboard or 3″ Mineral Wool Board or 4″ Foamglas
l P.C. or Std.	1½″ Aircell Block or 1″ to 1½″ 85% Mag. Block or 1″ Mineral Wool Blanket	1½″ Aircell Block or 1″ to 1½″ 85% Mag. Block or 1″ Mineral Wool Blanket	1½″ Aircell Block or 1″ to 1½″ 85% Mag. Block or 1″ Mineral Wool Blanket
k 85% Mag.	1½″ Aircell Block or 1½″ 85% Mag. Block or 1½″ Bestfelt Block or 1½″ Mineral Wool Blanket	1½″ Aircell Block or 1½″ 85% Mag. Block or 1½″ Bestfelt Block or 1½″ Mineral Wool Blanket	1½″ Aircell Block or 1½″ 85% Mag. Block or 1½″ Bestfelt Block or 1½″ Mineral Wool Blanket
k 85% Mag.	1½″ Aircell Block or 1½″ 85% Mag. Block or 1½″ Bestfelt Block or 1½″ Mineral Wool Blanket	1½″ Aircell Block or 1½″ 85% Mag. Block or 1½″ Bestfelt Block or 1½″ Mineral Wool Blanket	1½″ Aircell Block or 1½″ 85% Mag. Block or 1½″ Bestfelt Block or 1½″ Mineral Wool Blanket
—2″ Bestfelt	1½″ 85% Mag. Block or 1½″—2″ Bestfelt Block or 1½″ Mineral Wool Blanket	1½″ 85% Mag. Block or 1½″—2″ Bestfelt Block or 1½″ Mineral Wool Blanket	1½″ 85% Mag. Block or 1½″—2″ Bestfelt Block or 1½″ Mineral Wool Blanket
lt P.C.	2″ 85% Mag. Block or 2″—2½″ Bestfelt Block or 2″ Mineral Wool Blanket	2″ 85% Mag. Block or 2″—2½″ Bestfelt Block or 2″ Mineral Wool Blanket	2″ 85% Mag. Block or 2″—2½″ Bestfelt Block or 2″ Mineral Wool Blanket
½″—3″ Best-	3″ 85% Mag. Block or 3″—3½″ Bestfelt Block or 2″ Mineral Wool Blanket	3″ 85% Mag. Block or 3″—3½″ Bestfelt Block or 2″ Mineral Wool Blanket	3″ 85% Mag. Block or 3″—3½″ Bestfelt Block or 2″ Mineral Wool Blanket
t P.C.	3″ 85% Mag. Block or 3″—3½″ Bestfelt Block or 2½″ Mineral Wool Blanket	3″ 85% Mag. Block or 3″—3½″ Bestfelt Block or 2½″ Mineral Wool Blanket	3″ 85% Mag. Block or 3″—3½″ Bestfelt Block or 2½″ Mineral Wool Blanket
″ Hy-Temp.	4″ Bestfelt Block or Comb. 1½″ Hy-Temp. and 2½″ 85% Mag. Block or 2½″ Mineral Wool Blanket	4″ Bestfelt Block or Comb. 1½″ Hy-Temp. and 2½″ 85% Mag. Block or 2½″ Mineral Wool Blanket	4″ Bestfelt Block or Comb. 1½″ Hy-Temp. and 2½″ 85% Mag. Block or 2½″ Mineral Wool Blanket
emp. and 2″	Comb. 2½″ Hy-Temp. and 2″ 85% Mag. Block or 3″ Mineral Wool Blanket	Comb. 2½″ Hy-Temp. and 2″ 85% Mag. Block or 3″ Mineral Wool Blanket	Comb. 2½″ Hy-Temp. and 2″ 85% Mag. Block or 3″ Mineral Wool Blanket
% Mag. P.C.	Comb. 3″ Hy-Temp. and 2″ 85% Mag. Block or 3″ to 3½″ Mineral Wool Blanket	Comb. 3″ Hy-Temp. and 2″ 85% Mag. Block or 3″ to 3½″ Mineral Wool Blanket	Comb. 3″ Hy-Temp. and 2″ 85% Mag. Block or 3″ to 3½″ Mineral Wool Blanket
% Mag. P.C.	Comb. 3½″ Hy-Temp. and 1½″ 85% Mag. Block or 4″ Mineral Wool Blanket	Comb. 3½″ Hy-Temp. and 1½″ 85% Mag. Block or 4″ Mineral Wool Blanket	Comb. 3½″ Hy-Temp. and 1½″ 85% Mag. Block or 4″ Mineral Wool Blanket
	Comb. 5½″ Hy-Temp. and 2″ 85% Mag. Block or A-16 Insulating Fire Brick	Comb. 5½″ Hy-Temp. and 2″ 85% Mag. Block or A-16 Insulating Fire Brick	Comb. 5½″ Hy-Temp. and 2″ 85% Mag. Block or A-16 Insulating Fire Brick
	Comb. 6″ Hy-Temp. and 1½″ 85% Mag. Block or A-16 Insulating Fire Brick	Comb. 6″ Hy-Temp. and 1½″ 85% Mag. Block or A-16 Insulating Fire Brick	Comb. 6″ Hy-Temp. and 1½″ 85% Mag. Block or A-16 Insulating Fire Brick
	6″ Hy-Temp. Block or A-20 Insulating Fire Brick or Combination of Both	6″ Hy-Temp. Block or A-20 Insulating Fire Brick or Combination of Both	6″ Hy-Temp. Block or A-20 Insulating Fire Brick or Combination of Both
	A-20 Insulating Fire Brick (2000° Top Temp. Limit) A-23 Insulating Fire Brick (2300° Top Temp. Limit) A-25 Insulating Fire Brick (2500° Top Temp. Limit) A-26 Insulating Fire Brick (2600° Top Temp. Limit) A-28 Insulating Fire Brick (2800° Top Temp. Limit)		

SYMBOLS: S.T.B.—Special Thick Brine; C.B.—Corkboard; P.C.—Pipe Covering; Comb.—Combination Covering.

TREND TOWARD OUTDOOR PROCESSING

Protection of insulation one of the problems

DURING the war years there was a decided trend toward designing new general chemical process plants so that most of the equipment could be located outdoors. Although this idea in plant construction has been used for years in the petroleum and petroleum-chemical field, its wide application elsewhere has been recent, and there is every indication that the principle can now be applied to other industries.

The chief advantage of locating equipment out of doors is the saving in building construction. The main problem is to protect the insulation from the weather.

In sulfuric acid plants, for instance, the saving has averaged approximately 7% of the total plant cost. Obviously the extent of the savings will vary in different industries according to the amount of equipment which requires housing. Usually the possibility of locating equipment outdoors can be considered if the process is continuous and utilizes mostly pipes and closed tanks or vessels. In these instances the only housing generally required is for power supplies, raw material storage, offices or areas in which the product in process must be exposed.

DIFFERENT FINISHES USED

If the outdoor equipment is steel, protection against the elements is largely a matter of painting and nominal maintenance. In the case of the insulation used with this equipment the problem is not quite so simple.

Protection of the insulation on outdoor lines and equipment begins when the specifications are written. Although the insulation is applied in much the same manner as for indoor work, altogether different finishes are used.

Definite specifications have been established by Armstrong engineers through the years for weatherproofing the insulation on all types of equipment located outdoors. If these are followed, there is little reason for any but periodic maintenance. Due to fumes, acids, and other special operating conditions, cases arise in low and high temperature installations which call for deviations from the customary specifications for insulations and finishes. Armstrong laboratories have solved many of these problems in the past by developing new materials and specifications, and constant research work is being carried on to solve these problems throughout various industries as well as for specific day-to-day jobs.

Here are some of the rules to follow for general insulation work:

All outdoor insulation work should be done when the weather is above freezing, preferably above 40° F.

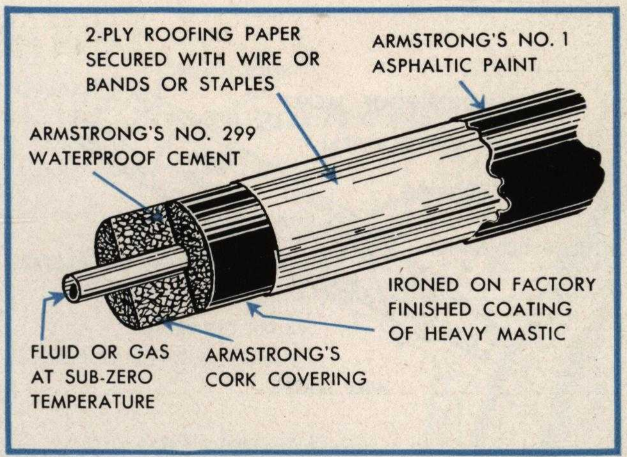
COLD LINES—After the cork covering has been applied according to standard specifications, apply one layer of two-ply roofing paper with at least a 2″ lap at all joints. Make sure that the lap in every instance forms a watershed as shown in the illustration. All laps should be sealed to prevent moisture penetration. Longitudinal laps should be additionally secured at intervals with coppered staples. Next wire the weatherproofing in place with No. 14 copper-clad wire on approximately 9″ center. Finish with one coat of Armstrong's No. 1 Cork Covering Paint.

One important point to remember is that the weatherproofing should butt the body of fitting covers and extend over the shoulders of screwed fitting covers.

COLD LINE FITTING COVERS—Due to their shape, a different problem is presented in weatherproofing fitting covers. The best method is to apply two coats of Armstrong's Weatherproofing Plastic to a total thickness of approximately 1/8″ when dry. The plastic should be applied evenly and neatly and should be brought over the edges of the fitting covers to seal the joints where the roofing paper on the straight line covering butts the fitting cover.

TANKS AND OTHER LOW-TEMPERATURE EQUIPMENT—Due to their size, somewhat different specifications apply to equipment placed outdoors. Wherever 1 1/4″ x 18 gauge galvanized bands with angle clips and bolts are called for in the standard specifications for installing board-form insulation indoors, substitute 3/4″ x 25 gauge galvanized bands and clips on 9″ centers.

After the insulation work has been completed, the final step is the application of the weatherproof finish. After the bands have been put in place, apply a 1/16″ coat of Armstrong's Weatherproof Plastic, and while it is still tacky a layer of Armstrong's Saturated Membrane should be thoroughly pressed into the plastic with a trowel. After the solvent has evaporated leaving the first coat dry, a second coat approximately 1/16″ thick should be applied to completely fill the voids and entirely cover the fabric surface.

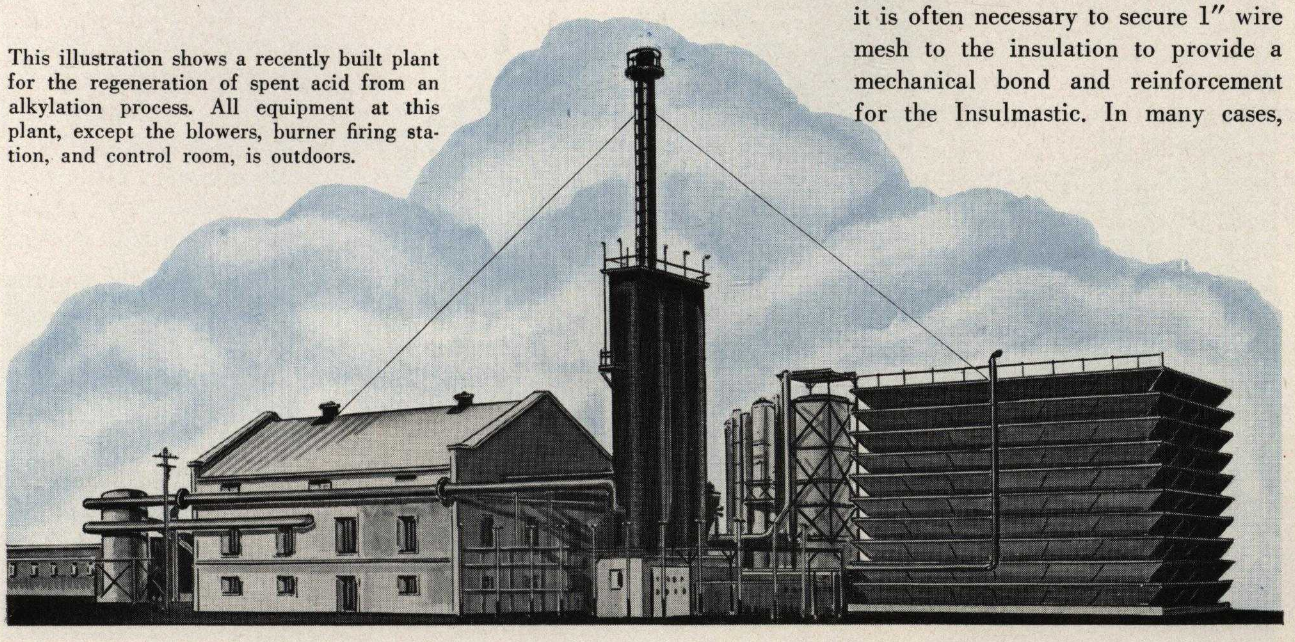

2-PLY ROOFING PAPER SECURED WITH WIRE OR BANDS OR STAPLES
ARMSTRONG'S NO. 1 ASPHALTIC PAINT
ARMSTRONG'S NO. 299 WATERPROOF CEMENT
IRONED ON FACTORY FINISHED COATING OF HEAVY MASTIC
FLUID OR GAS AT SUB-ZERO TEMPERATURE
ARMSTRONG'S CORK COVERING

WEATHERPROOFING INSULATED OUTDOOR COLD LINES

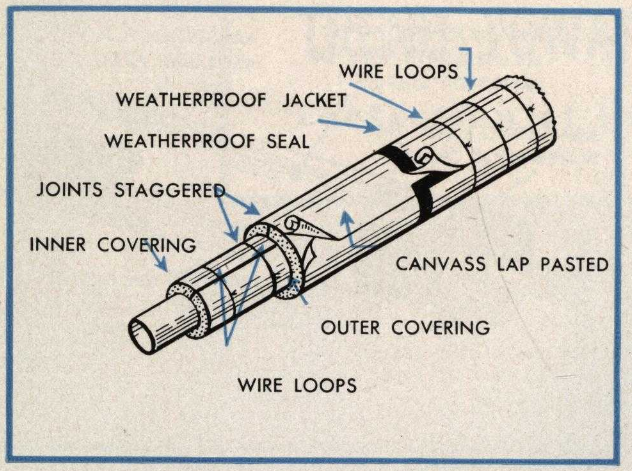
ALTERNATE METHOD

An alternate method of weatherproofing lines and equipment has been developed using Armstrong's Insulmastic, a weatherproof, fire-resistant material of heavy troweling consistency which bonds well to insulation and does not crack. This method is particularly advantageous where fire hazards developing from solvents during installation are highly objectionable.

In this case, two coats of the Insulmastic, each approximately 1/8″ thick, should be applied after the insulation has been completely installed. These two coats when dry should have a final thickness of not more than 3/16″. On large equipment it is often necessary to secure 1″ wire mesh to the insulation to provide a mechanical bond and reinforcement for the Insulmastic. In many cases,



This illustration shows a recently built plant for the regeneration of spent acid from an alkylation process. All equipment at this plant, except the blowers, burner firing station, and control room, is outdoors.



WEATHERPROOFING INSULATED HOT LINES

too, a prime coat of straight asphalt emulsion should be applied before the two coats of Insulmastic.

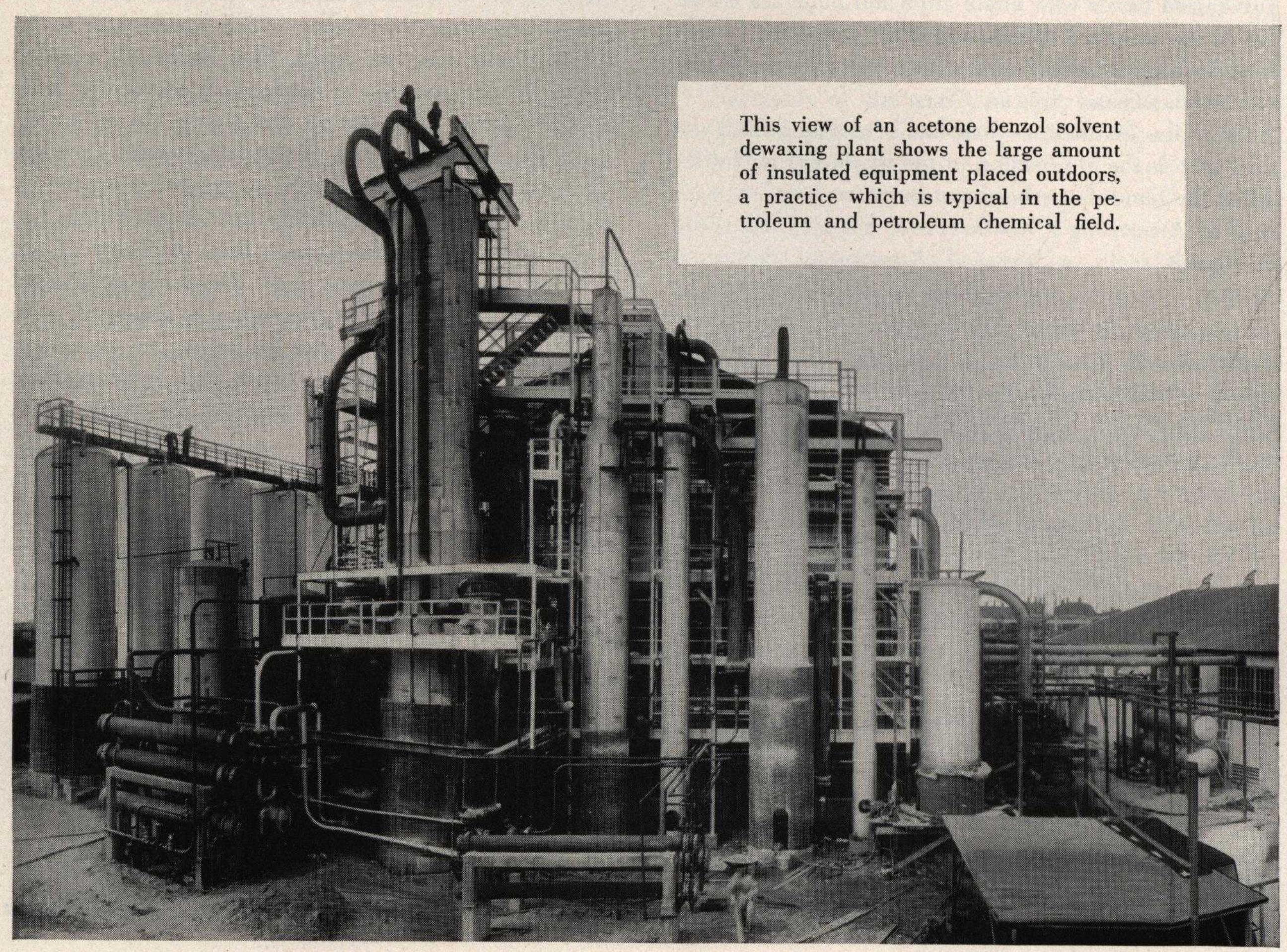
Cork fitting covers are handled in much the same way as when using weatherproofing plastic. Two coats of Armstrong's Insulmastic are applied, each approximately ⅛″ thick, which when dry should have a final thickness of not more than 3⁄16″.

HOT LINES—Cover the insulation with heavy roofing paper, lapped 3″. The lap should be turned down and sealed. Wire the paper in place with copper or galvanized wire on 4″ centers. If a fire resistant finish is desired, apply 45-lb. asbestos base roofing paper lapped, sealed, and wired on in the same manner.

HOT EQUIPMENT—After the usual hard finish is applied according to standard specifications, it should be primed with an asphaltic priming paint; then trowel on two ⅛″ coats of Armstrong's Insulmastic. The second layer of the cement finish should be left rough to provide a bond for the Insulmastic.

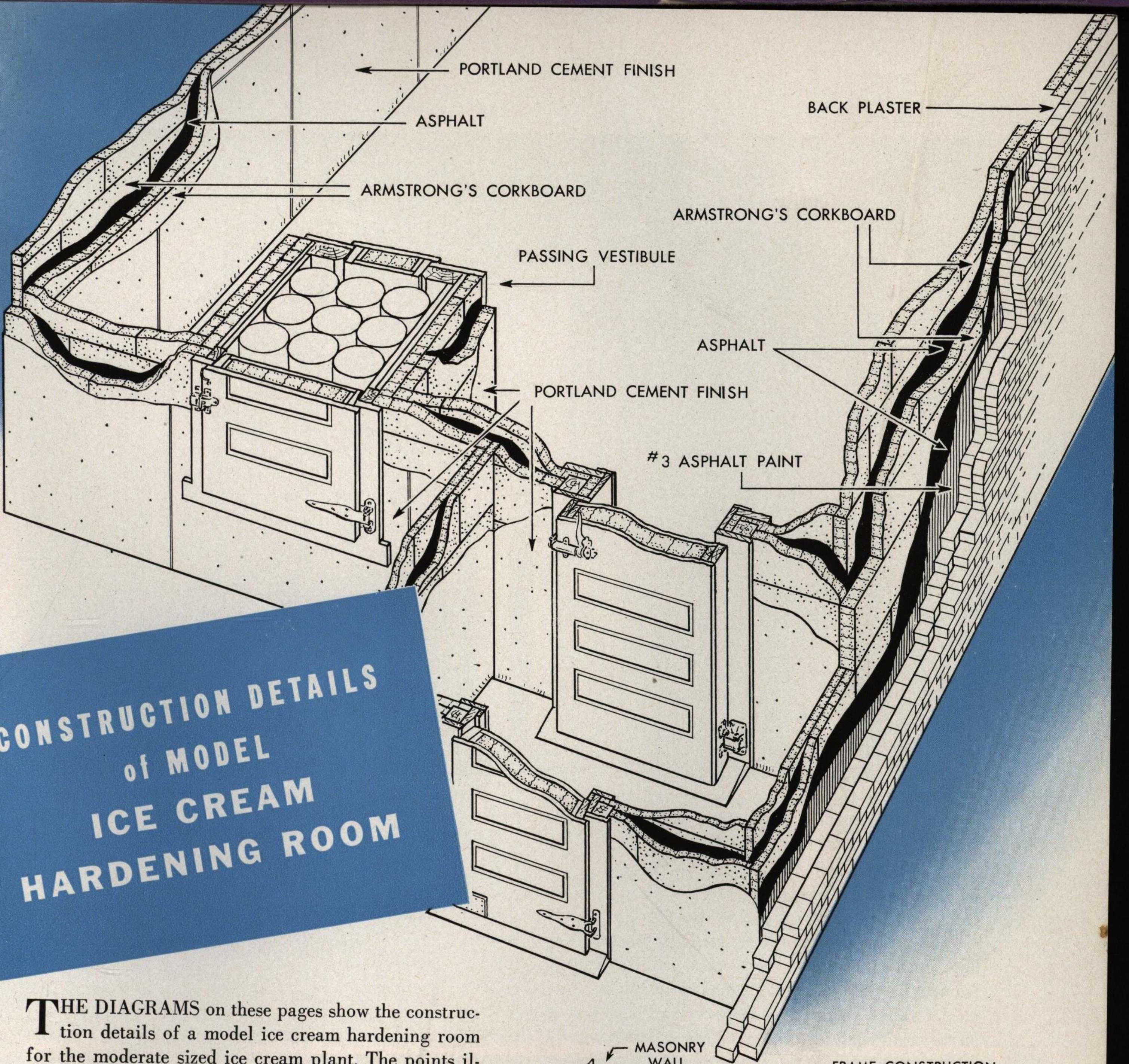
Thorough examinations should be made at least once a year to locate loose bands, broken wires, faulty hanger alignment, damage to the insulation, cracks in the finish, and to determine the need for repainting or resurfacing.

Experience has shown that if care is taken in writing the proper specifications, selecting material, installing the insulation, and establishing the maintenance program, there is every reason to believe that insulation will present no unusual problems which would prohibit the installation of outdoor plants.



This view of an acetone benzol solvent dewaxing plant shows the large amount of insulated equipment placed outdoors, a practice which is typical in the petroleum and petroleum chemical field.

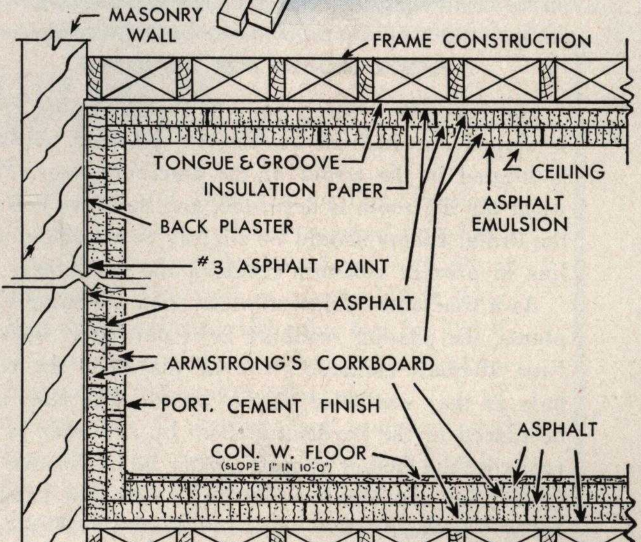
CONSTRUCTION DETAILS of MODEL ICE CREAM HARDENING ROOM

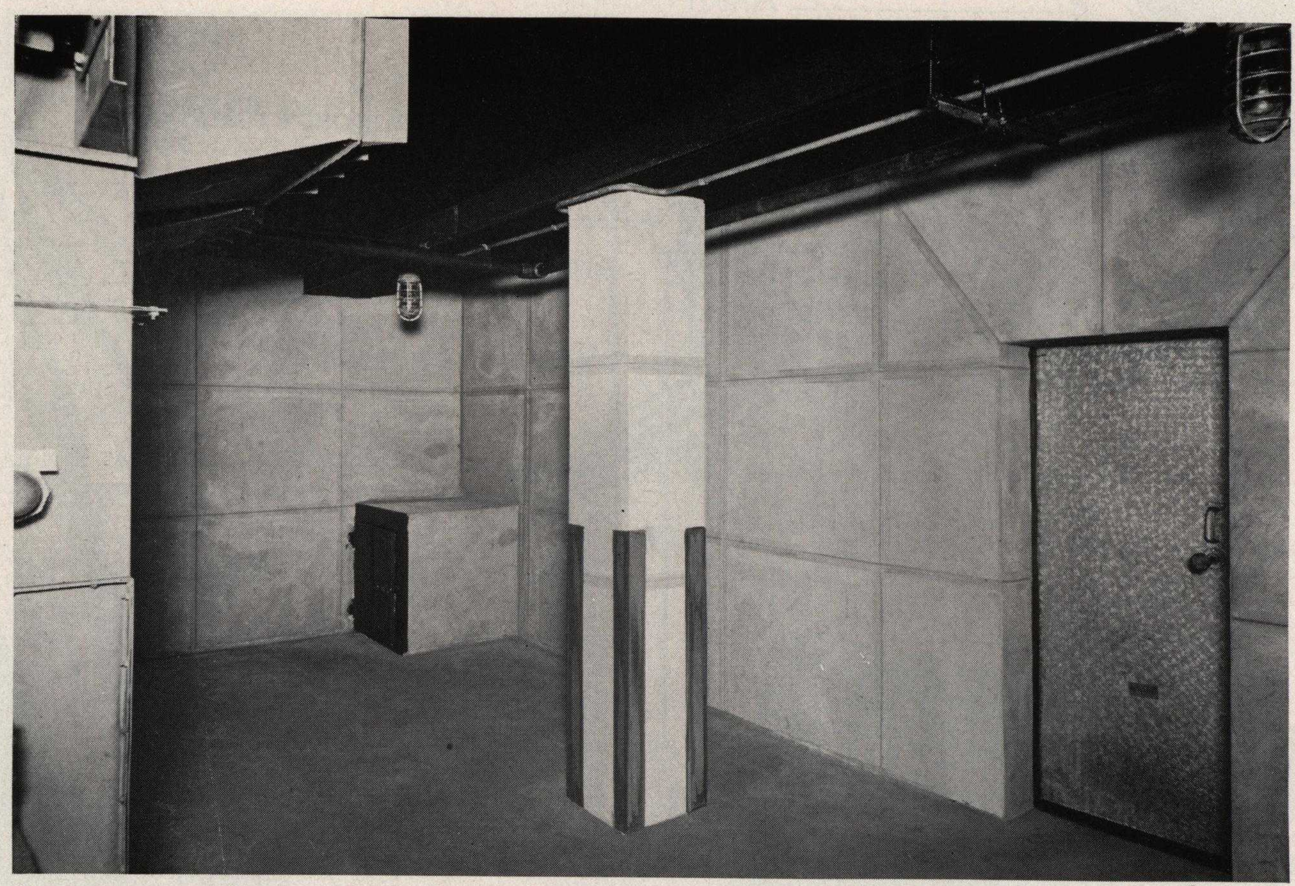


THE DIAGRAMS on these pages show the construction details of a model ice cream hardening room for the moderate sized ice cream plant. The points illustrated have been evolved over many years and, while other types of construction are sometimes used to meet various conditions, these details can be followed to good advantage when building or remodeling.

As modern practice calls for hardening at lower temperatures than ever before, this room has been designed to be operated at 25° F. to 35° F. below zero. Sufficient thickness of insulation is used in the floor, walls, and ceiling to give the maximum insulating efficiency. Thicknesses greater than standard should be used where summer temperatures are high, or in localities where long periods of hot weather prevail, or on ceilings which form the roofs of buildings.

The anteroom, built primarily to save refrigeration in the larger room by decreasing the temperature differential at the door, is usually operated at 36° to





This picture of a typical ice cream hardening room shows how the passing vestibule can be placed at any convenient spot to simplify work. This particular room is constructed throughout with two layers of Armstrong's Corkboard Insulation each 4″ thick. The walls are finished with portland cement plaster and the ceiling with Armstrong's Plastic Emulsion.

38° F. Metal shelving can be installed in this room for the storage of syrups and mixes.

Asphalt emulsion finish is used on the ceilings of both rooms to reduce the weight hanging from the frame construction. A portland cement finish is used on the walls because it is hard and durable. It is scored on approximately 4′ centers to reduce cracking.

FLOOR SLOPED FOR DRAINING

The concrete wearing floor in the hardening room is sloped one inch in ten feet to the door. A drain is located in the center of the anteroom floor. Thus when the big room is defrosted, any moisture flows to the drain. Floors should be slightly coved at the wall line to prevent moisture reaching the insulation.

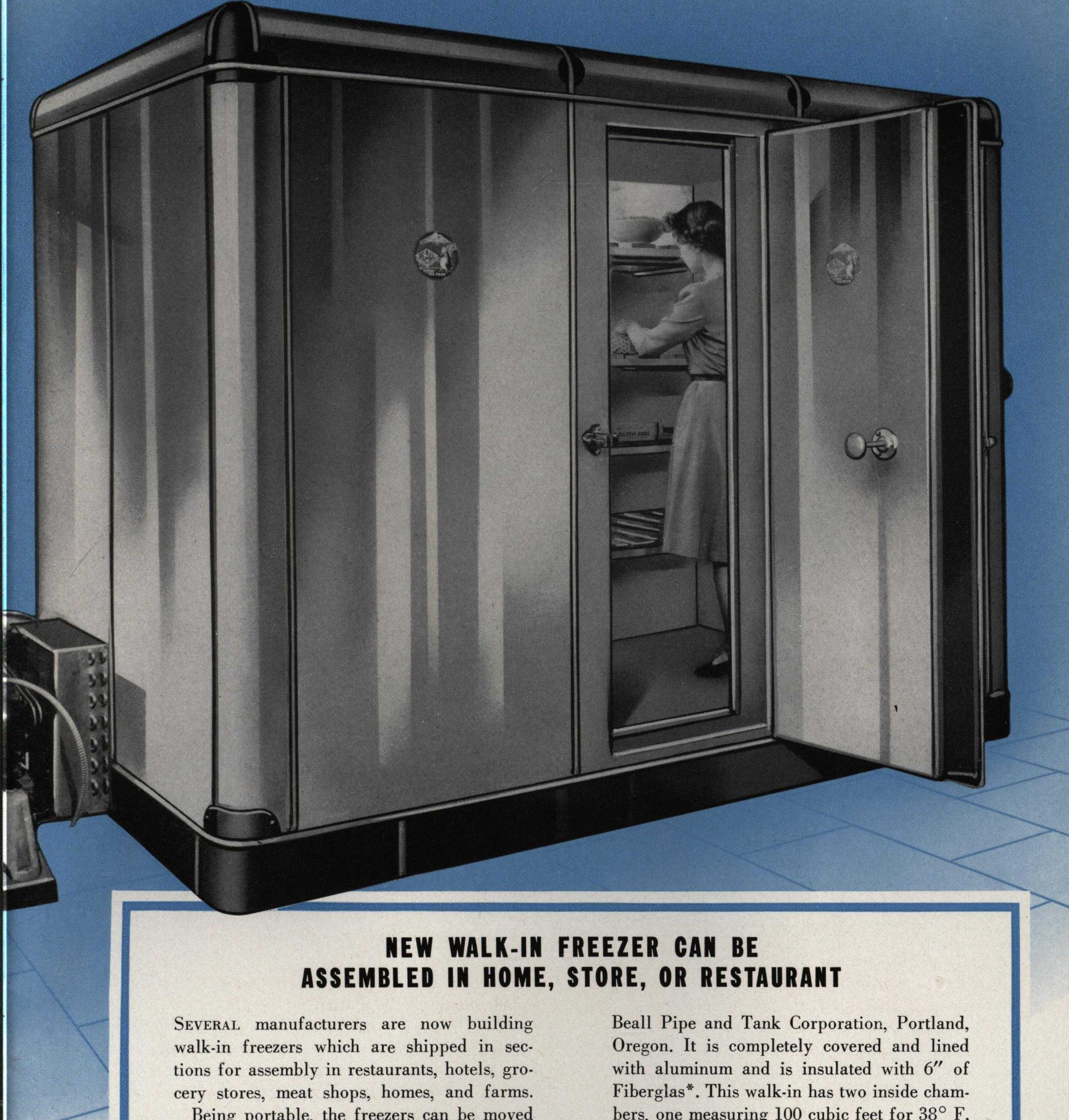
As a time and refrigeration saver in moderate sized plants, the passing vestibule is of particular interest. Nine 40-quart containers can be placed in the vestibule as they are filled at the freezer. The cans may be placed in the hardening room by a worker in the room, or the freezer operator, after he has loaded the freezer for another run, can do it as a new batch is being produced. This passing vestibule eliminates opening the large super-freezer door many times each day, and the resulting savings in refrigeration will pay for this addition many times over.

DOORS ARE IMPORTANT

As the door in any low-temperature room is the point of greatest refrigeration loss, this detail is extremely important. The hardening room door should be a super-freezer type of over-lapping construction, and the one for the anteroom should be a well-built freezer door.

Any shelving coils for fixed equipment inside the rooms should be supported on structures within the rooms to prevent puncturing the insulation. Hangers which are installed through the insulation permit warm air infiltration with the subsequent danger of moisture and ice collecting to damage the insulation. For this same reason electrical conduits should be brought in through the wall in which the door is set, and the leads distributed within the room on the underside of the insulation.

Metal corner beads on all salient corners also are economical additions. They will protect the corners of the insulation from damage such as usually occurs from hand trucks and similar equipment.



NEW WALK-IN FREEZER CAN BE ASSEMBLED IN HOME, STORE, OR RESTAURANT

SEVERAL manufacturers are now building walk-in freezers which are shipped in sections for assembly in restaurants, hotels, grocery stores, meat shops, homes, and farms.

Being portable, the freezers can be moved through narrow doors and can be easily and quickly dissembled for relocation. Freezing and storage areas are provided in the units, making their use extremely versatile.

Shown above is an excellent example of this type of construction produced by the Beall Pipe and Tank Corporation, Portland, Oregon. It is completely covered and lined with aluminum and is insulated with 6″ of Fiberglas*. This walk-in has two inside chambers, one measuring 100 cubic feet for 38° F. storage space, and the other 60 cubic feet for freezing at 20° to 30° below zero.

The unit is entirely self-contained and measures $8\frac{1}{2}'$ long, $6\frac{3}{4}'$ high, and 5′ deep. Its aluminum construction makes it easy to clean and maintain.

---

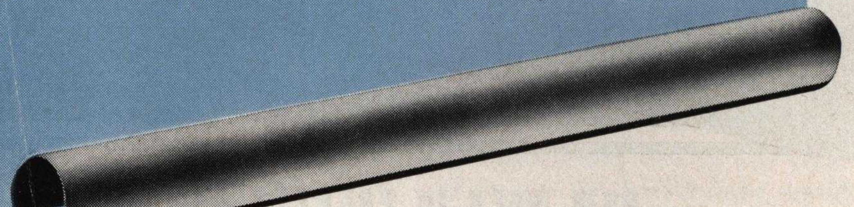
*T.-M. REG. U. S. PAT. OFF.—OWENS-CORNING FIBERGLAS CORP.

ARMSTRONG CORK COMPANY

Building Materials Division • Lancaster, Pa.

ARMSTRONG OFFICES

- ALBANY
- ATLANTA
- BALTIMORE
- BIRMINGHAM
- BOSTON
- BUFFALO
- CHARLOTTE
- CHICAGO
- CINCINNATI
- CLEVELAND
- COLUMBUS
- DALLAS
- DENVER
- DETROIT
- HARTFORD
- HOUSTON
- INDIANAPOLIS
- JACKSONVILLE
- KANSAS CITY
- LOS ANGELES
- LOUISVILLE
- MEMPHIS
- MILWAUKEE
- MINNEAPOLIS
- NEW ORLEANS
- NEW YORK
- PHILADELPHIA
- PITTSBURGH
- PROVIDENCE
- RICHMOND
- ROCHESTER
- ST. LOUIS
- SAN FRANCISCO
- SEATTLE
- TULSA
- WASHINGTON, D. C.



PRINTED IN UNITED STATES OF AMERICA

Digitized by:

INTERNATIONAL

ASSOCIATION
FOR
PRESERVATION
TECHNOLOGY,
INTERNATIONAL
www.apti.org

BUILDING
TECHNOLOGY
HERITAGE
LIBRARY

https://archive.org/details/buildingtechnologyheritagelibrary

From the collection of:
Mike Jackson, FAIA